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3 May 1977

MEMORANDUM FOR THE RECORD

SUBJECT: Field Station Planning and Accommodation [REDACTED]

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1. Obviously the Agency's operating agreements and relationship with [REDACTED] a key element to consider when planning for the AXANET system of the future. This memorandum explores some of the alternative methods for jointly meeting [REDACTED] Agency future communication needs. It is apparent that additional analysis is required before a decision is made to change course but it may well be an appropriate time to open a dialogue within OC and with [REDACTED]. It would now be opportune to form an [REDACTED] working level planning group to explore system alternatives.

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2. Four approaches to field station systems are analyzed in the Attachment A. Each approach is technically viable. The field concentrator would require the most changes to our present system but might well offer the most long term benefits. The black MUX system provides [REDACTED] privacy but at an appreciable cost in cryptographic equipment, space, air conditioning and other renovations, ATS expansion, etc. This approach assumes that [REDACTED] requires privacy universally but [REDACTED] original requirement was for a private channel wherever the [REDACTED] traveled. Some compromise might be possible within these bounds. AFT will have limited utility as an Agency only system. Due to cost, the system will only be installed at larger field stations. If [REDACTED] and the Agency shared AFT and the associated costs, it would then be cost effective to use the system at more locations.

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3. The proliferation of field station systems and equipments should be reviewed for several reasons. First, field station space is finite and we will soon reach a point where additional equipment cannot be efficiently and economically added to a CCC. A worse case would entail [REDACTED] adding an AK-4 rack for KW-7 installations and a TERP system. TERP may allow the removal of [REDACTED] HW-28 units if the off-line cryptographic feature is incorporated. On [REDACTED] the CCC we can visualize the addition of a SKYLINK terminal, the retention of the PRS HF system, the addition of SKYMUX rack, an AFT system or an OCR/PTP, retention of at least one M-28 for paper tape requirements, retention of HW-28 equipment

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for off-line purposes, the addition of a field station unattended operations (FSUO) rack or safe and retention of KW-7 and KG-13 cryptographic equipment. It is also possible that selected field stations will have to accommodate data terminals and NOC hardware in the future. Secondly, many of the proposed systems overlap in regard to operating features. Attachment two illustrates this situation in relation to a single case, cast processing. It will be noted that in this case increasing real or apparent channel or printing speed provides diminishing returns since the human capacity to log and process messages eventually becomes the barrier to greater throughput. Greatly increased throughput can ultimately only be achieved by changing our system of message handling and accountability.



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Attachment:
As stated

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Attachment A

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Field System Approaches to Accommodate []

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	Switch Impact	Field System Impact	Transmission System Impact	HF Backup Impact	Disadvantages	Benefits
AFT Port	None	AFT expanded for additional port, to handle ACP-127 format, for software CSR protection. [] costs reduced from TERP to M-40 or M-28.	None required but data rate increase desirable.	75 bps HF sufficient. No service discontinued.	Complex field system. High level of field maintenance and software support. No error control.	Single system. Operator efficiency gain. Backup simplified. Efficient use of channel capacity. Could use AVD to clear backlogs.
25X1 Red MUX	Conversion to KG-13.* Red MUX to [] ATS port expansion.	[] requires TERP or other terminal device. Conversion to KG-13.*	Data rate increase to 300/600 bps.	Fall back to single 75 bps channel. Service withdrawn for separate channel operations.	Inefficient use of channel capacity. May have to mix red and black circuits. Service reduced during HF.	Agency workload reduced. [] crypto not required. Only one type crypto system required. Easily accommodate add. requirements.
25X1 Black MUX	Black MUX to [] ATS port expansion and extensive KW-7 installation at []	[] requires KW-7 and terminal equipment. Possible modifications to power, air cond. and []	Data rate increase to 300/600 bps.	Fall back to single 75 bps channel. Service withdrawn for separate channel operations.	Each circuit requires separate crypto. Service reduced during HF backup. Inefficient use of channel capacity.	[] gains privacy. Agency workload reduced.
25X1 Field Concentrator	New MAX III switch or front end. Conversion to block protocol. Conversion to KG-13.*	New field device allows multiple I/O and dynamic sharing of channel capacity. Conversion to KG-13.* [] requires terminal equipment.	Data rate increase to 300/600 bps.	Fall back to single 75 bps channel. No service discontinued.	New system. MAX III modifications or front-end. Pos. requirement for ATS front-end.	Centralized msg. accounting possible. Efficient use of channel capacity. Error correction. Flexible. Handles data requirement. Backup simplified. Can use AVD to clear backlogs.

* The KG-13 could be replaced with a KG-84

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Attachment B

Throughput Analysis of Various Systems

	<u>Circuit Running or Print Time</u>	<u>Logging*</u>	<u>Throughput</u>
Present operations at 75 bps.	180 mins.	46 mins.	180 mins.
Present operations at 150 bps (overload used)	90 mins.	46 mins.	90 mins.
25X1 [] operates own circuit, e.g. SKYMUX. One 75 bps for Agency.	108 mins.	34 mins.	108 mins.
25X1 [] operates own circuit, e.g. SKYMUX. 150 bps (overload used) for Agency.	54 mins.	34 mins.	54 mins.
Increase channel speed to 300 bps as proposed by FAB.	60 mins.	46 mins.	60 mins.
25X1 Per above but [] operates separate circuit.	36 mins.	34 mins.	36 mins.
FSUO**	9 mins.	46 mins.	46 mins.
25X1 FSUO. [] operates separate circuit.	6 mins.	34 mins.	34 mins.
AFT at 75 bps.	180 mins.	0	180 mins.
AFT at 300 bps.	60 mins.	0	60 mins.
25X1 AFT at 300 bps. [] operates separate circuit.	36 mins.	0	36 mins.
AFT/FSUO combination. or AFT with AVD cast dump.	9 mins.	0	9 mins.

* The logging figure does not include message tear and collation processes. The true human throughput boundary may be higher than indicated. Assumptions: three hour cast.

70 messages at 250 words each.
40% of traffic []
49 seconds required for logging []
26 seconds required for logging []

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** Figures are distorted since system must operate at 75 bps to produce a paper tape for []

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